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President Bush Sees NNSA Counterterrorism Technologies

Counterterrorism technologies developed by NNSA's laboratories were prominently featured during a recent demonstration of the Department of Energy's homeland defense research capabilities for President Bush.

During a visit to Argonne National Laboratory in Illinois, the President and Secretary of Energy Abraham saw demonstrations of the Biological Aerosol Sentry and Information System (BASIS) system, developed by LLNL and LANL for NNSA, to detect airborne biological agents; the Program of Response Options and Technology Assessments for Chemical/Biological Terrorism (PROTECT) system, developed by Argonne for NNSA, which can detect chemical agents in a transit system or other enclosed space; a display of the joint DOE-NNSA project to sequence and analyze the various biological pathogens; the National Infrastructure Simulation and Analysis Center (NISAC), developed by Sandia and LANL, that can provide improved technical planning and analysis of critical infrastructure in the event of a terrorist attack; and a decontamina-

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NNSA Labs Win Eight Prestigious R&D 100 Awards

Three NNSA laboratories have won eight R&D 100 Awards in the annual competition for innovative technology sponsored by R&D Magazine, a trade publication based in the Chicago area.

Lawrence Livermore National Laboratory in California won five of the prestigious awards, Sandia National Laboratories in New Mexico won two, and Los Alamos National Laboratory, also in New Mexico, won one. Technical experts chosen by R&D Magazine select 100 winners of the annual contest. The winning research must not only be original but also show

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Pres. Bush SeesTechnologies continued from page 1

tion foam developed by Sandia that was used to clean facilities contaminated with anthrax last fall.

The President also saw radiation detectors and other equipment used by the NNSA's Nuclear Emergency Support Team (NEST).

"Our scientific community is serving on the front lines of this war, by developing new technologies that will make America safer. I've just come back from viewing some demonstrations of the great work done at national laboratories, whether it be here, or Los Alamos, or Sandia or others. The American people need to know we've got a lot of brain power working on ways to deal with the threats that we now face as we head into the 21st century," said President Bush.

The President has outlined a key role for the NNSA laboratories under his proposed Department of Homeland Security. The new department will draw on the capabilities and expertise of the laboratories, while still allowing them to support the NNSA's other nuclear security missions.

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NNSA Labs Win Awards continued from page 1

promise of real-world application. The winners will be honored at a banquet the magazine hosts in October at Chicago's Navy Pier.

Lawrence Livermore's five winning entries are a powerful solid-state laser system, a technology for production of laser diode pumps, a miniaturized medical device, a thin film coating tool for semiconductor production, and an in-situ technology for disease detection, treatment and prevention.

The Sandia winners invented the Component Analysis Software (COMPASS), which automatically analyzes the chemistry of a micro or macrostructure; and the MTR8500 Very Short Reach (VSR) OC-192 Parallel Array Transponder Module. COMPASS was developed to automate chemical analysis of micron to sub-micron microstructural features in the scanning electron microscope (SEM). The new short-reach (less than 300 meters) transponder is expected to reduce costs significantly because 75 percent of optical interconnects are in this shorter distance class. It will open the information age to more and more people in new ways.

Los Alamos scientists won for GENetic Imagery Exploitation, or GENIE, which mimics evolution to create more effective algorithms for detecting features in digital images produced by a variety of remote-sensing techniques.

GENIE's ability to evolve superior algorithms allows it to find the features of interest in nearly any set of images. GENIE can be used to map damage caused by natural disasters such as wildland fires, hurricanes, floods, earthquakes and volcanoes or man-made ones such as terrorist attacks.

Here are more details on the five winning Livermore technologies:

Livermore's Solid-State Heat-Capacity Laser has an output of 13,000 watts, making it the most powerful solid-state laser system in the world. The technology for this compact, high-average-power laser offers a range of applications for military defense and industrial processing.
The Silicon Monolithic Microchannel Cooled Laser Diode Array is a modular packaging technology that allows the production of the smallest and most powerful laser diode pumps ever.

The TIM-2002 is a miniaturized and condition-specific medical device that delivers low-level electrical pulses through the skin to inhibit or interfere with pain signals to the brain. This award is shared with two companies-Cyclotec Advanced Medical Technologies Inc. and Iophysical Laboratory Ltd.

The Production-Scale Thin Film Coating Tool for Next-Generation Semiconductor Technology has enabled the successful implementation of the Extreme Ultraviolet

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Labs Win Awards continued

Lithography project as the technology for manufacturing the next generation of microprocessors, leading to computers that will be 100 times faster than those currently available. The award is shared with a New York company, Veeco Instruments Inc.

In-Situ Rolling Circle Amplification will help shift the disease detection, prevention, and treatment capabilities of the Human Genome Project from the laboratory to the clinic. It can identify a single damaged or abnormal, disease-related DNA base out of the approximately six billion in one human cell.

New Mexico-Designed Weapons System Refurbished by California-Led Team

Sandia National Laboratories in California is managing a program to refurbish a substantial fraction of the W80 warheads in the stockpile to extend their life and to increase both safety and security - without underground nuclear testing.

The first major weapons engineering development program at the site for a decade, the Life Extension Program for the W80 was assigned to Sandia/California and Lawrence Livermore National Laboratory in part to balance the nuclear weapons workload between Lawrence Livermore and Los Alamos national laboratories. The W80 was originally developed by Los Alamos and Sandia/New Mexico, with the first units fielded in 1982.

Message from Linton Brooks

NNSA is undergoing a number of transitions and changes, including a leadership change as I take over for John Gordon as acting administrator. I thought I would try convey in a general sense what I think these transitions mean.

As I have told the Secretary and many of you, my goal as acting administrator is to ensure that we maintain momentum and move ahead on the many important initiatives we are working on. Our missions are critical to the nation's defense and our programs are simply too important to be delayed or sidetracked. General Gordon got this agency started and moving in a positive direction, and I plan to pick up where he left off. NNSA will not drift in the months it will take to name and confirm a new Administrator. I plan to make decisions that need to be made, to work to make sure we have the tools we need, and help spread the word about our many successes and accomplishments.

One very important initiative that I expect to be personally involved in is the effort to transform NNSA into a streamlined and more efficient operation. The NNSA reengineering initiative is entering a critical phase, where we move beyond the details of how we will be organized to looking at how many people it will take to perform our essential missions and where those people need to be located. Equally important will be our efforts to try to change how we do business. We are concentrating our efforts in a number of key areas, including procurement, oversight and assessment, federal program management and the PBBE process.

I have no doubt that NNSA will be smaller than it is today once we have fully implemented our reengineering plan. My personal expectation and belief is that the natural process of attrition, combined with some retirement incentives, will get us to the optimal size. Of course, change is never easy and I know there are bound to be many questions along the way. We will work to get you information and answers to questions promptly as decisions are made.

In addition, our future operations, particularly at the NNSA labs and in some of our WMD R&D programs, will be affected by the President's plan to establish a Department of Homeland Security. Although the final shape of the new Department has yet to be determined, what is clear is that NNSA laboratories and people will continue to make critical contributions to homeland security and combating weapons of mass destruction even after the new Department opens for business.

I will need your support, your enthusiasm and your ideas in the coming months if we are to succeed.

Linton Brooks

NIF'S First Light Set for 2003

Four laser beams will be fired into a one-million-pound target chamber next year when the National Ignition Facility (NIF) provides "first light""– a key milestone NNSA's Office of Defense Programs' work to complete construction of the world's largest laser.

NIF is currently under construction at Lawrence Livermore

National Lab and is scheduled for completion in 2008. The achievement of "first light" means that experiments can begin in the facility next year.

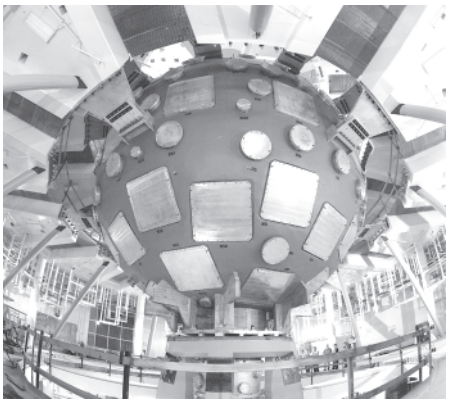
In total, more than 192 laser beams will be installed in NIF, a stadium-sized facility that is a cornerstone of the nation's Stockpile Stewardship Program. Data from NIF will validate sophisticated computer models for certification of the safety and reliability of the nation's nuclear stockpile – without underground testing. By focusing individual laser beams onto small targets containing deuterium and tritium to produce fusion ignition in a laboratory setting, NIF will be the only experimental facility able to produce the extreme temperatures, pressures and dynamic conditions found in stars and/or nuclear weapons. Nuclear fusion is a feature of all modern nuclear weapons and is a potential future energy source. By the time NIF is fully completed in 2008, more than 1500 experiments will already have been performed.

"This has been a banner year for NIF," said Ed Moses, LLNL's NIF project manager. "We've met every NNSA milestone either on or ahead of schedule."

One of the most significant milestones this fiscal year was the completion of the conventional facilities construction – a $270 million dollar, seven-acre building complex housing clean room facilities, the laser bays and the target and diagnostics building. Other milestones were the installation of the first 96–precision-aligned and cleaned laser beam enclosures, and the precision setting and alignment of the 10 meter diameter, one million-pound target chamber – the latter of which required alignment better than one-hundredth of an inch.

In addition, NIF's computer and control rooms are now completed and have been turned over to operating and commissioning staff for the commencement of software installation and testing and the power supplies for the laser amplifier system have been installed and energized.

A number of significant technical achievements have also been made: all 3,072 meter-sized laser glass slabs for NIF have been produced and additional first-light optics, including mirrors, spatial filter lenses, crystals for optical switches and frequency conversion, and final focus lenses are now at the NIF site. The NIF optics assembly and installation team successfully assembled laser components into the modules that will be installed into the laser beam enclosures. Over the past several months the team inserted a variety of optics and hardware including laser glass, flashlamps, and spatial-filter assemblies to verify that the



precision alignment and cleanliness levels can be achieved. Installation and commissioning of the laser modules that will be used in the first light experiments now has begun.

General Gordon Receives Gold Award

Secretary of Energy Spencer Abraham awarded former NNSA Administrator Gen. John Gordon the Secretary's Gold Award, in recognition of his outstanding effort to establish and lead the National Nuclear Security Administration.

Gordon left NNSA in early July to join the staff of the National Security Council as the Deputy Assistant to the President, National Director and Deputy National Security Advisor for Combating Terrorism.

At a reception for General Gordon, Secretary Abraham said, "NNSA could not have had a better person to handle the difficult work of getting a new agency started from scratch. We are going to miss John, but he has left us with a strong plan to follow that will allow NNSA to fully realize the goals laid out by Congress when it established NNSA."

Pantex Expertise Contributing to Cancer Research

BWXT Pantex Applied Technology scientists, in collaboration with other researchers in the Amarillo area, are exploring a new approach to cancer therapy that may be more effective yet have fewer side effects than current treatments.

The new approach, called "tumor-specific immunotherapy," uses the body's innate ability to defend itself against cancer.

The research at Pantex is being conducted by Jan Birkbeck, Bobby Russell and Bill Moddeman in conjunction with three medical institutions in Amarillo: Texas Tech University Health Science Center, the Veterans Administration, and Harrington Regional Medical Center, Inc.

"The key lies with a molecule called mucin, a protein found in mucus," said Moddeman. "In cancer cells, the structure of mucin is significantly different from that of normal mucin. This difference has been observed in cancers of the breast, prostate, pancreas, ovaries, lungs, kidneys, and intestines."

The unique collaboration between medical researchers and nuclear weapons plant scientists began several years ago at a local American Chemical Society meeting when Moddeman met his counterparts from Tech, the VA and the regional medical center.

"When I realized that our technology at Pantex could help, we submitted a joint proposal for research funding to the Department of Defense," Moddeman said. "The grant was awarded, and we have been making progress ever since."

He said surface analysis equipment used at Pantex to examine

Continued on page 6

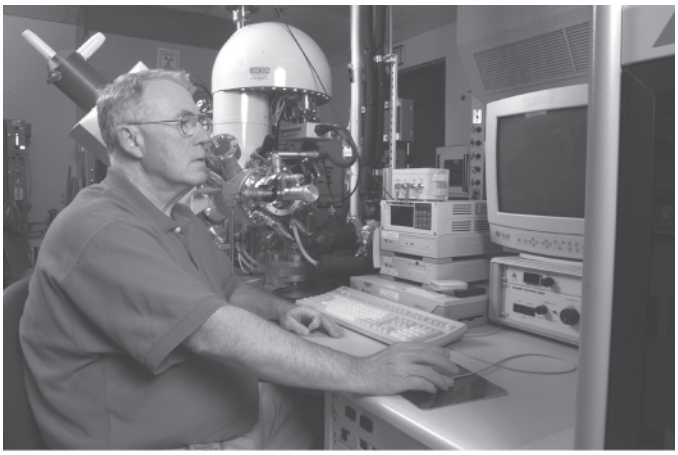
Pantex Cancer Research continued

weapons components such as high explosives is also being used for the cancer research.

"The mucin proteins are made of carbon, nitrogen, oxygen and hydrogen," he said. "Interestingly, high explosives are made from the same four elements."

Using spectroscopic and enzymatic digestion techniques, the team of scientists found that the normal mucin molecule is a protein surrounded by a sheath. They learned that the sheath has many knob-like protrusions, which, in the normal mucin molecule, block certain critically-important sites on the core protein.

But in the mucin of cancerous cells, most of the knobs are gone. This difference can be recognized by the body's immune system (the T cells) which then target the cancerous cells for destruction.



Because the nearly-bare molecules will activate only those T cells that specifically attack cancer cells and do not activate others, these cancer-attacking T cells can be grown in the laboratory and infused back into a patient.

Such experiments with animals have been performed successfully. At the Veterans Administration hospitals, clinical trials using human subjects have just begun.

The ultimate goal of this research is to manufacture tumor-specific, nearly-bare mucin molecules to treat numerous types of cancer. Another goal is to prevent these cancers by injecting the molecules as a vaccine.

Moddeman said, "When this therapy becomes available, it will save many lives, and make treatment of many cancers quick and free of side effects."

Success Fits American Glovebox Society

Say "glovebox," and most people think small. Say the same word at Y-12, and most people think big. Both adjectives fit the American Glovebox Society—a small organization with a big impact.

The society of 250 members was established in 1986. Rodney Smith of Y-12 Engineering and Technology has served in various capacities since the society's inception, most notably as the second president and as the current editor of *Enclosure*, the AGS newsletter.

The society grew from a vendor's suggestion. "He was working with several clients from DOE sites and suggested that we get together and save some money," Smith recalled.

With all of the sites facing similar containment challenges, the idea had obvious merit. So, in the summer of 1986, another vendor picked up this idea and sponsored a conference. The American Glovebox Society was a product of this event.

Without the society, Smith believes it would cost more to perform work at Y-12, and less would be known about containment technology. Because of his involvement in AGS, Smith says he can get a few good minds working on a problem with just a phone call.

News Briefs

NNSA Receives Project Management Institute Credentials

The Office of Project Management and Engineering Support (NA-54) has been accepted as a Registered Education Provider (REP) by the Project Management Institute (PMI), giving NNSA the distinction of becoming the first federal government agency to receive REP credentialing.

The REP program is the premier comprehensive continuing education program related to the field of project management.

★★★★★★★

National Atomic Museum Gets New Home

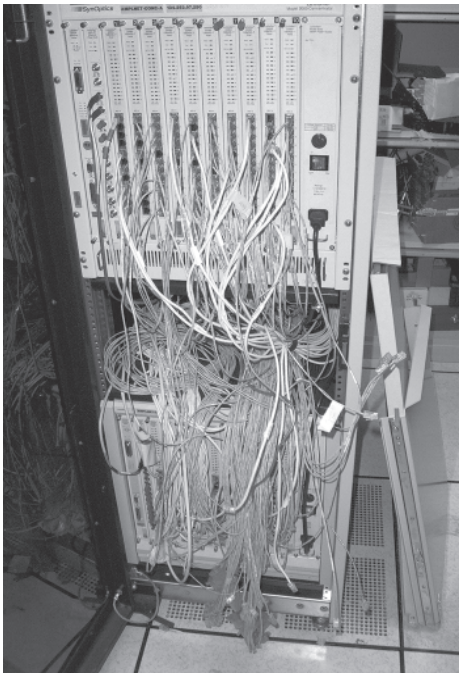
The National Atomic Museum reopened to the public in Albuquerque's Old Town area in May, eight months to the day after being closed down in the wake of the September 11 terrorist attacks.

The museum includes an extensive collection of unclassified nuclear weapons technology and historical exhibits and educational materials about nuclear medicine and other peaceful uses for nuclear technology. Sandia National Laboratories operates the museum for the Department of Energy. Museum Director Jim Walther believes the new location could attract about 150,000 visitors a year.

Infrastructure Update

Communications Upgrade Project at Sandia Succeeds On Many Levels

The NNSA's Facilities and Infrastructure Initiative Program recently improved the communications infrastructure in a building that houses the Advanced Manufacturing Process Laboratory at Sandia National Laboratories in New Mexico.



Modern switches in new IDRs replaced this outdated switching equipment in Building 878.

The communications system for Building 878 was originally designed for 60 users and linked manufacturing research and development to manufacturing capabilities across Sandia's Technical Area I. By all measures, the volume on this system had far exceeded its capacity. The number of users had grown to 225, data transmission demand per user had tripled, and overall demand grew nine-fold without corresponding system upgrades.

In addition, the old communications network posed a possible computer security vulnerability because the network did not have the capability to disconnect or deactivate individual communications drops not in use, making it potentially vulnerable to unauthorized users to access the system. The building is not located inside Sandia's restricted access area.

Fiber optic installation in Building 878 greatly enhanced communications capability and capacity.

Upgrades were made to both the communications infrastructure

Infrastructure continued

within Building 878 and the service feed to the building. Two new intermediate distribution rooms (IDRs) were constructed to serve user points throughout the building. The upgrades were specially designed to allow the addition of classified computing to the building at minimal cost should the building be brought back into the restricted access area in the future.

The upgrades dramatically improved the capability and capacity in the communications system. Every desktop can now communicate at 100 Mb/s, which is a two to fourteen-fold increase in network capacity. In addition, the upgraded system improves security by providing the ability to control the flow of information all the way to individual network drops, ensuring proper monitoring for unauthorized access. The project was completed ahead of schedule and $105,000 under budget.

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Science and Engineering Scholarships Awarded to New Mexico Women

Ten recipients of Department of Energy funded Science and Engineering scholarships have been recognized at a Society of Women Engineers, Central New Mexico Section (SWE/CNM) banquet in Albuquerque.

The NNSA's Albuquerque Operations Office worked in cooperation with the SWE/CNM to solicit applications for scholarship funding to support the advancement of women in math, science or engineering disciplines. The ten scholarship recipients were selected from a pool of 32 applicants who are currently enrolled in engineering or science curricula at post-secondary institutions in New Mexico. The scholarships were awarded to the recipients based on combined ratings for grade-point average, financial need, participation in extracurricular activities, and submission of an essay.

Scholarship recipients are: Priscilla Bustamante and Jaynee Weems from New Mexico State University; Emily Cary, Candice Jang, Sariah Jurado, Tiffany Roberts, Margaret Stevenson, and Mariko Suga from the University of New Mexico; Mary Irwin from New Mexico Tech, and Lea Keedo from the Southwestern Indian Polytechnic Institute.

SWE is a nationwide educational service organization devoted to encouraging girls and women to pursue careers in science, engineering, and technology fields. In spite of efforts to increase the number of female engineering graduates in the United States only about one in nine practicing engineers is female.

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